

## CLAIMS

1. A gene targeting vector for introducing an exogenous gene into the ZO-1 gene region in a non-human animal, wherein the vector comprises the exogenous gene and an entire or partial region of the ZO-1 gene.
2. The vector of claim 1, comprising a structure in which the entire or partial region of the ZO-1 gene is placed upstream and/or downstream of the exogenous gene.
3. The vector of claim 2, wherein the partial region of the ZO-1 gene comprises exon II or a portion thereof.
4. The vector of claim 3, comprising a structure in which either one of the DNA fragments in (a) and (b) below is placed at each side of the exogenous gene:
  - (a) a 1.5 kb Bsp1286I-Bsp1286I fragment comprising a partial exon II of the ZO-1 gene and its upstream, and an 8.5 kb PstI-BamHI fragment located downstream of exon II;
  - (b) a 5.1 kb PstI-BsrDI fragment comprising a partial exon II of the ZO-1 gene and its upstream, and a 3.9 kb PstI-SphI fragment located downstream of exon II.
5. A gene targeting vector for introducing an exogenous gene into the ZO-2 gene region or the Disabled-2 gene region of a non-human animal, wherein the vector comprises the exogenous gene and an entire or partial region of the ZO-2 gene or the Disabled-2 gene.
6. The vector of claim 5, wherein the vector comprises a structure in which an entire or partial region of the ZO-2 gene or the Disabled-2 gene is placed upstream and/or downstream of the exogenous gene.
7. The vector of any one of claims 1 to 6, wherein the vector is used for generating a non-human animal expressing an exogenous gene or a non-human animal cell expressing an exogenous gene.
8. The vector of any one of claims 1 to 7, wherein the vector comprises in the upstream of an exogenous gene a promoter capable of transcribing the exogenous gene.
9. The vector of any one of claims 1 to 8, wherein the vector further comprises a marker gene expression cassette.

10. The vector of claim 9, wherein the vector comprises a structure in which an exogenous gene is placed adjacent to the downstream of a marker gene expression cassette.

5 11. The vector of any one of claims 1 to 6, wherein the exogenous gene is a marker gene expression cassette.

12. The vector of any one of claims 9 to 11, wherein the marker gene expression cassette is a drug resistance gene expression cassette.

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13. The vector of claim 12, wherein the drug resistance gene expression cassette is a DNA fragment comprising  $\beta$ -geo.

14. The vector of any one of claims 1 to 13, wherein the non-human animal is a mouse.

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15. A method for epithelial cell gene targeting, wherein the method comprises introducing a targeting vector into the cell by electroporation under the conditions of 0.4 to 0.5 kV voltage and 125 to 250  $\mu$ F condenser capacity.

20 16. The method of claim 15, wherein calcium concentration in a prepared cell solution used for electroporation is 5  $\mu$ M or less.

17. The method of claim 15 or 16, wherein the targeting vector targets the ZO-1 gene, the ZO-2 gene, or the Disabled-2 gene on cellular chromosome.

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18. The method of claim 15 or 16, wherein the targeting vector is any one of claims 1 to 13.

19. The method of any one of claims 15 to 18, wherein the epithelial cell is derived from a higher animal cell.

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20. The method of claim 19, wherein the higher animal is a mouse.

21. The method of claim 20, wherein the cell is the EpH4 mouse epithelial cell line.

35 22. A method for producing an epithelial cell line having an artificially altered chromosome, wherein the method comprises introducing a targeting vector into an epithelial cell line by the

gene targeting method of any one of claims 15 to 21.